***IN THE DRAWINGS***:

Please substitute the attached replacement sheets for FIGS. 2 and 4 of record.

## ***REMARKS***

By the present Amendment, the drawings have been amended to address the issue noted on page two of the Office Action. Specifically, replacement sheets have been provided for FIGS. 2 and 4 to identify these drawings as "Prior Art." Entry of this Amendment is in order, and such action is respectfully requested.

In the Office Action, it was indicated that FIGS. 2 and 4 should be designated by a legend such as "Prior Art". Attached are replacement sheets for FIGS. 2 and 4 to identify these drawings as "Prior Art." It is respectfully requested that acceptance of the drawings be confirmed in a Notice of Allowability or, if not immediately allowed, in the next Office Action Summary.

Claims 1-4 were rejected under 35 USC §103(a) as being unpatentable over the patent to Chang et al (U.S. 5,808,793) in view of the patent publication to Trotter, Jr. (U.S. 2002/0154403). Reconsideration of this rejection is respectfully requested in view of the following detailed remarks and comments.

It was asserted in the rejection that the presently claimed invention would have been obvious to one of ordinary skill in the art under combined teachings of the Chang patent, which allegedly discloses a broadband, semi-double-type optical isolator, and the Trotter publication, which allegedly discloses an optical isolator making use of a polarizer

comprising photonic crystals. More specifically, it was asserted in the Office Action that FIG. 4 of Chang depicts a polarization-dependent optical isolator unit made up of a polarizer (49a), a Faraday rotator (45a), a polarizer (49b), a Faraday rotator (45b) and a polarizer (49c). It was further asserted that the broadband, semi-double-type optical isolator of the presently claimed invention can be made up by replacing the polarizers(49a, 49c) of the Chang patent with the polarizers of the Trotter publication, each of which comprises photonic crystals.

Applicants cannot agree with the foregoing assertions. Specifically, it is unreasonable to contend that because (1) the optical isolator of the Trotter publication is nothing but a structure having a defect sufficiently serious not to function as an optical isolator and (2) where the broadband semi-double-type optical isolator of the Chang patent is combined with the optical isolator of the Trotter publication, it is natural that polarizers are so used that all three polarizers (49a, 49b, 49c) are replaced with the polarizer comprising photonic crystals and it is not necessary that polarizers are so used that only two polarizers (49a, 49c) among the polarizers provided in threes (49a, 49b, 49c) are selectively replaced with the polarizer comprising photonic crystals.

***Conventional polarization-dependent optical isolator making use of glass polarizer***:

Conventional polarization-dependent optical isolators which use glass polarizers have the structure of glass polarizer/Faraday rotator/glass polarizer as shown in Fig. 1A

of the attached EXHIBIT. Then, as shown in Fig. 1B of the same EXHIBIT, forward-directed light passes through the incident-side glass polarizer (on the left side as viewed in FIG. 1A). Thereafter, its plane of polarization is rotated by 45° at the Faraday rotator. Hence, light passes through the emergent-side glass polarizer (on the right side as viewed in FIG. 1A) without any attenuation of light (see lines 9-14 of page 2 of the subject specification as filed).

On the other hand, as shown in Fig. 1C of the attache EXHIBIT, even where the reflection return light has passed through the emergent-side glass polarizer (on the right side as viewed in Fig. 1A), its plane of polarization is rotated by 45° at the Faraday rotator. Hence, the light crosses the plane of polarization of the incident-side glass polarizer (on the left side as viewed in Fig. 1A) and is intercepted (see lines 15-21 of page 2 of the specification as filed).

Since the glass polarizer is an absorption type polarizer, the above reflection-return light is absorbed in the incident-side glass polarizer (on the left side as viewed in FIG. 1A) and is intercepted without being reflected at this glass polarizer.

***Trotter's optical isolator uses a polarizer comprising photonic crystals***

As shown in Fig. 2A of the attached EXHIBIT, the optical isolator of the Trotter publication uses a polarizer comprising photonic crystals and has the structure of photonic crystal polarizer/Faraday rotator/photonic crystal polarizer. Then, as shown in Fig. 2B of

the same EXHIBIT, forward-directed light passes through the incident-side photonic crystal polarizer (on the left side as viewed in Fig. 2A), after which its plane of polarization is rotated by 45° at the Faraday rotator. Thus, light passes through the emergent-side photonic crystal polarizer (on the right side as viewed in Fig. 2A) without any attenuation of light.

On the other hand, as shown in Fig. 2C of the attached EXHIBIT, even where reflection-return light has passed through the emergent-side photonic crystal polarizer (on the right side as viewed in Fig. 2A), its plane of polarization is further rotated by 45° at the Faraday rotator. Consequently, the light crosses the plane of polarization of the incident-side photonic crystal polarizer (on the left side as viewed in Fig. 2A) and is intercepted.

However, the photonic crystal polarizer is a reflection-type polarizer, and it differs from a glass polarizer as is set forth at column 2, lines 1 and 2 of the Trotter publication, as well as FIG. 2 thereof. Accordingly, light intercepted at the incident-side photonic crystal polarizer (on the left side as viewed in Fig. 2A of the attached EXHIBIT) is reflected at this photonic crystal polarizer and again enters the Faraday rotator.

Then, its plane of polarization is further rotated by 45° by the Faraday rotator. As a result, light crosses the plane of polarization of the incident-side photonic crystal polarizer (on the right side as viewed in Fig. 2A of the attached EXHIBIT) and is intercepted. Thus-intercepted light is reflected at this photonic crystal polarizer and again enters the Faraday rotator, where its plane of polarization is rotated by 45° and finally passes through the

incident-side photonic crystal polarizer (on the left side as viewed in Fig. 2A).

Thus, according to the Trotter publication, the optical isolator makes use of the polarizer comprising photonic crystals, and reflection-return light is repeatedly reflected twice in the interior of the optical isolator and finally passes through the incident-side photonic crystal polarizer (on the left side as viewed in Fig. 2A). Such an optical isolator by no means functions as an optical isolator. Since the optical isolator of the Trotter publication is nothing but a structure having a sufficiently serious defect so as not to function as an optical isolator, there can be no technical inducement to use this optical isolator, which does not function as an optical isolator, in combination with the broadband, semi-double-type of the Chang patent.

If, for the sake of argument, one did combine the broadband semi-double-type optical isolator according to the Chang patent with the optical isolator of the Trotter publication, it would be natural that the polarizers are used so that all three polarizers (49a, 49b, 49c) are replaced with the polarizer comprising photonic crystals. There is no technical reason why only two polarizers (49a, 49c) among the polarizers provided in a group of three (49a, 49b, 49c) should be selectively replaced with the polarizer comprising photonic crystals.

Accordingly, any broadband semi-double-type optical isolator that may be made up of polarizers which are used so that all three polarizers (49a, 49b, 49c) are replaced with the polarizer comprising photonic crystals would have the structure shown in Fig. 3A of the

attached EXHIBIT. As is shown therein, this broadband semi-double-type optical isolator has the structure of a photonic crystal polarizer/Faraday rotator/photonic crystal polarizer/Faraday rotator/photonic crystal polarizer.

However, in the broadband semi-double-type optical isolator as shown in Fig. 3A of the EXHIBIT also, the reflection-return light is, as shown in Fig. 3B, repeatedly reflected four times in the interior of the optical isolator and finally passes through the incident-side photonic crystal polarizer (on the left side as viewed in Fig. 3A). Thus, such an optical isolator by no means functions as an optical isolator.

More specifically, as shown in Fig. 3B of the EXHIBIT, even where the reflection-return light has passed through the emergent-side photonic crystal polarizer (on the right side as viewed in Fig. 3A), its plane of polarization is rotated by 45° at the Faraday rotator near the emergent side (the second from the right as viewed in Fig. 3A). Consequently, light crosses the plane of polarization of the middle-positioned photonic crystal polarizer (the middle as viewed in Fig. 3A) adjacent this Faraday rotator, and is intercepted. However, since this photonic crystal polarizer is a reflection-type polarizer, as stated previously, light intercepted at the middle-positioned photonic crystal polarizer (the middle as viewed in Fig. 3A) is reflected at this photonic crystal polarizer and again enters the Faraday rotator near the emergent side (the second from the right as viewed in Fig. 3A).

Then, its plane of polarization is further rotated by 45° by this Faraday rotator. Hence, light crosses the plane of polarization of the emergent-side photonic crystal polarizer (on the right side as viewed in Fig. 3A) and is intercepted. Light thus intercepted is reflected at this photonic crystal polarizer and again enters the Faraday rotator near the emergent side (the second from the right as viewed in Fig. 3A), where its plane of polarization is further rotated by 45°. Thereafter, it passes through the middle-positioned photonic crystal polarizer (the middle as viewed in Fig. 3A) and enters the Faraday rotator near to the incident side (the second from the left as viewed in Fig. 3A).

As to the reflection-return light having entered the Faraday rotator near to the incident side (the second from the left as viewed in Fig. 3A), its plane of polarization is rotated by 45° at this Faraday rotator. Thereafter, the light crosses the plane of polarization of the incident-side photonic crystal polarizer (on the left side as viewed in Fig. 3A) and is intercepted. Light thus intercepted is reflected at this photonic crystal polarizer and again enters the Faraday rotator near to the incident side (the second from the left as viewed in Fig. 3A). Then, its plane of polarization is further rotated by 45° by this Faraday rotator. As a result, the light crosses the plane of polarization of the middle-positioned photonic crystal polarizer (the middle as viewed in Fig. 3A) and is intercepted. Light thus intercepted is reflected at this photonic crystal polarizer and again enters the Faraday rotator near to the incident side (the second from the right as viewed in Fig. 3A), where its plane of polarization is further rotated by 45°, and passes through the incident-side

photonic crystal polarizer (on the left side as viewed in Fig. 3A).

Therefore, in the broadband semi-double-type optical isolator in which all three polarizers (49a, 49b, 49c) in the Chang patent are replaced with the polarizer comprising photonic crystals, the reflection return light is repeatedly reflected four times in the interior of the optical isolator and finally undesirably passes through the incident-side photonic crystal polarizer (on the left side as viewed in Fig. 3A of the EXHIBIT). As a consequence, such an optical isolator by no means functions as any type of practical optical isolator.

Thus, even if the broadband semi-double-type optical isolator of the Chang patent is combined with the optical isolator of the Trotter publication as asserted in the Action, such a combination does not produce the broadband semi-double-type optical isolator of the claimed invention, which functions as the optical isolator.

***Broadband semi-double-type optical isolator of the claimed invention***

In the broadband semi-double-type optical isolator recited in claim 2, the middle-positioned polarizer is a glass polarizer and also the outer-side polarizer is a polarizer comprising photonic crystals. More specifically, the broadband semi-double-type optical isolator of the presently claimed invention has the structure of photonic crystal polarizer/Faraday rotator/glass polarizer/Faraday rotator/photonic crystal polarizer.

Thus, the broadband semi-double-type optical isolator of the claimed invention enables itself to function as the optical isolator because any reflection of the reflection

return light does not take place in the interior of the optical isolator.

That is, in the broadband semi-double-type optical isolator of the claimed invention, having the structure of photonic crystal polarizer/Faraday rotator/glass polarizer/Faraday rotator/photonic crystal polarizer, the reflection return light having passed through the emergent-side photonic crystal polarizer and the plane of polarization of which has been rotated by 45° at the Faraday rotator near to the emergent side crosses the plane of polarization of the middle-positioned glass polarizer to become intercepted. Then, since the glass polarizer is an absorption type polarizer as stated previously, the above reflection return light is absorbed in the middle-positioned glass polarizer to be intercepted without being reflected at this glass polarizer. Accordingly, the broadband semi-double-type optical isolator of the claimed invention enables itself to function as the optical isolator because any reflection of the reflection return light does not take place in the interior of the optical isolator.

For at least the foregoing reasons, it is submitted that the pending claims are allowable over the patent publications to Chang and Trotter. Accordingly, withdrawal of the outstanding rejection is in order, and such action is respectfully requested.

To the extent necessary during prosecution, Applicant hereby requests any required extension of time not otherwise requested and hereby authorize the commissioner to

charge any required fee not otherwise provided, including application processing, extension, and extra claims fees, to Deposit Account 01-2340.

Respectfully submitted,

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Enclosure: EXHIBIT (Figs. 1A-3B); Replacement Sheets (2)

Fig.1A

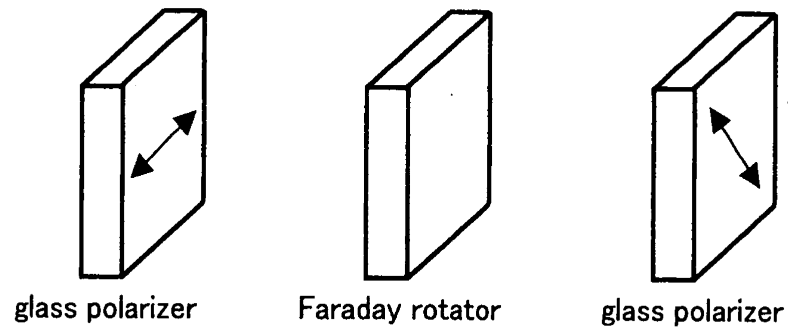



Fig.1B

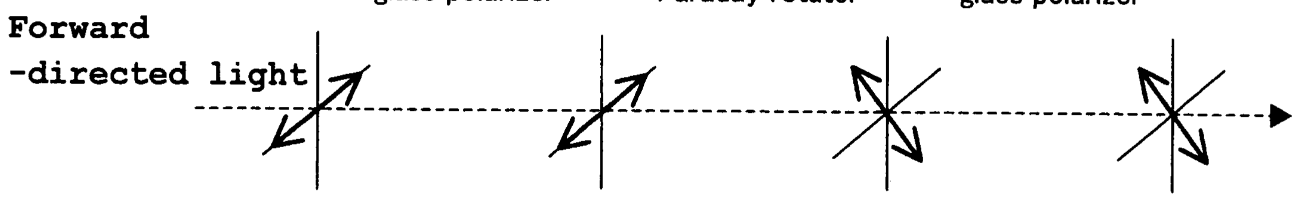
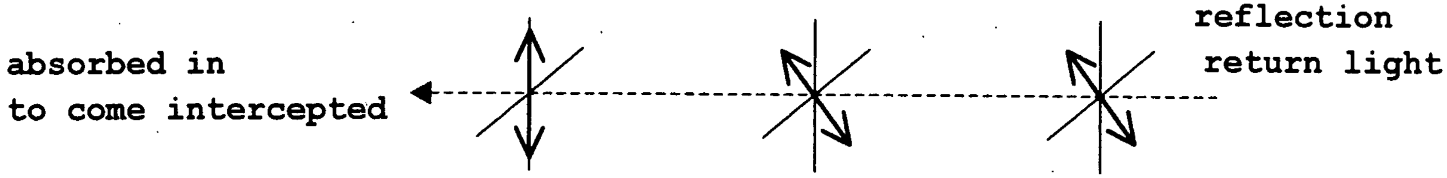



Fig.1C



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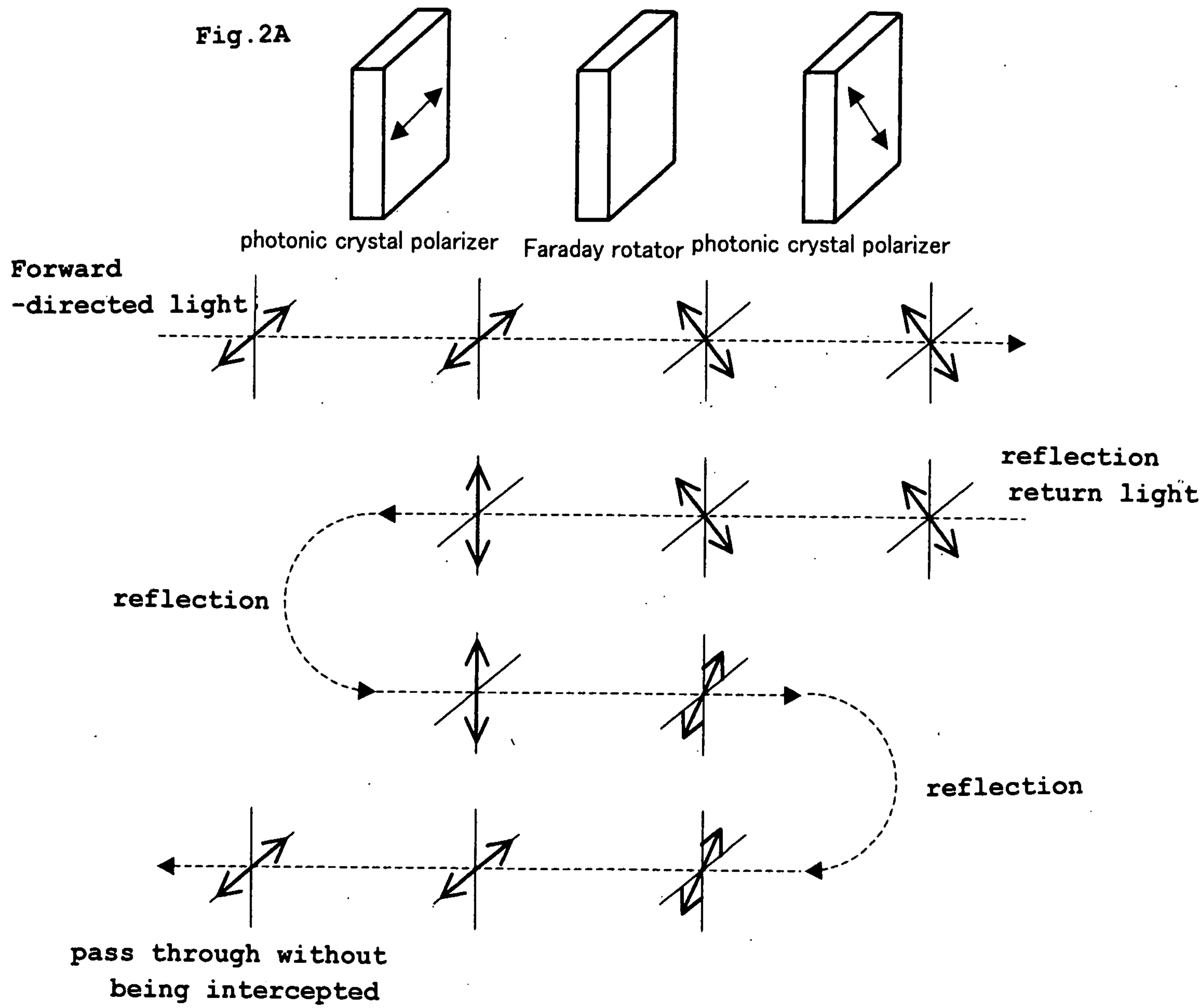


Fig.2A
Fig.2B
Fig.2C

Fig.3A

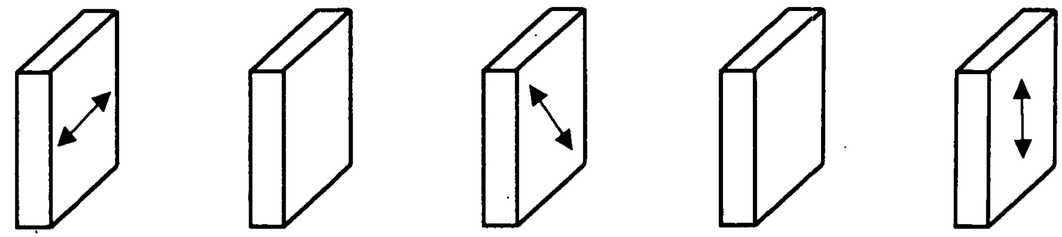


Fig.3B

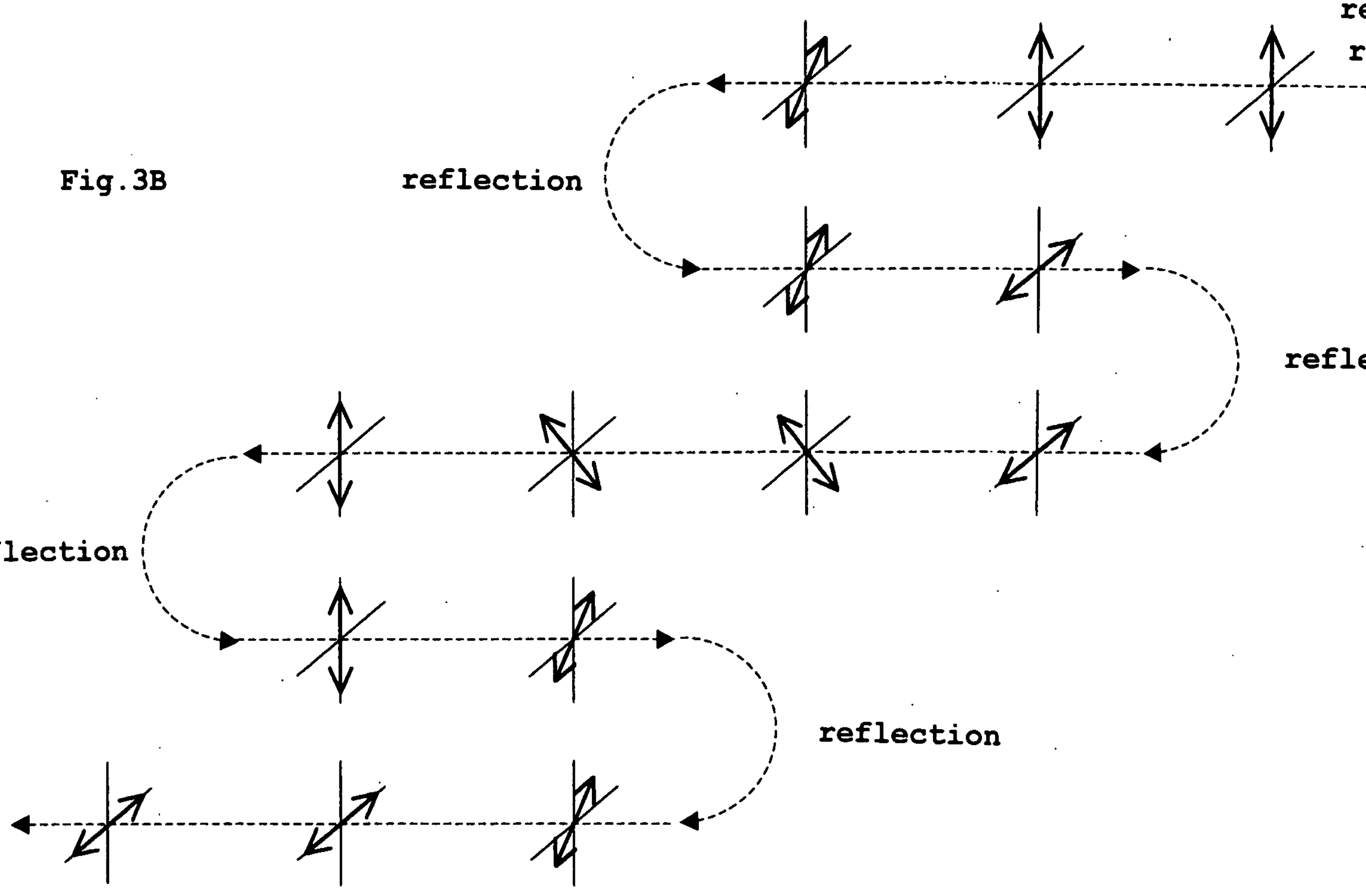




EXHIBIT TO AMENDMENT 10/531,284